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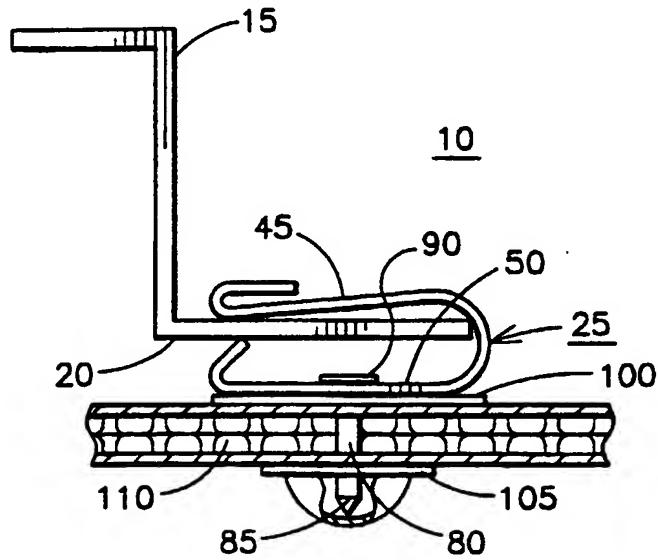
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(54) Title: ASSEMBLY AND METHOD FOR ATTACHING INSULATION MATERIAL

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(57) Abstract: An assembly and method utilizing a clip and pin configuration is provided for attaching insulation material in a building. A clip (25) having a pair of grabbing members (45, 50) with a aperture (55) defined therebetween receives a flange (20) of a frame member (15). A pin (80) is inserted into an opening (75) in one of the grabbing members (50), and is used to pierce the insulation material (110). A set of washers (100, 105) is connected to the pin (80) to retain the pin (80) in the opening (75) and to retain the insulation material (110) in the pin (80).



*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## ASSEMBLY AND METHOD FOR ATTACHING INSULATION MATERIAL

### FIELD OF THE INVENTION

The field of this invention relates to the installation of insulation materials in buildings and similar structures, and more specifically, to an assembly and method utilizing a clip and pin combination for attaching insulation to a frame member.

### BACKGROUND OF THE INVENTION

5       The installation of insulation material in buildings may require that the insulation be attached to a frame member of the structure. Generally, pins have been welded or glued to the frame member and then the insulation material is attached using the pins. This has presented several problems. First, the welding and gluing processes are time consuming, which makes the  
10      attachment of the insulation material tedious and inefficient. This often leads to installation and construction delays, inefficient utilization of labor, and increased installation and construction costs. Second, the bonds created by the welding and gluing processes may weaken over time, causing the pin and thus the insulation to become detached from the frame member. Third,  
15      the pins are often attached to the frame member at unaligned positions of the member, resulting in uneven or crooked alignment of the insulation material.

Although U.S. Patent No. 2,584,194 to Drury appears to disclose a securing device for affixing insulation material to a strip steel framing member, this device is believed to have several drawbacks. First, the  
20      insulation material must be specially manufactured to include a tab that can be clamped to the frame member. Second, the clamping pressure applied to this tab may cause the insulation material to tear, resulting in the detachment of the insulation material from the frame member. Third, even if the insulation material does not tear, the tab may be pulled out of the clip,  
25      causing the insulation material to become detached from the frame member.

Accordingly, it is desirable to provide an assembly for attaching insulation material to a frame member that overcomes the above disadvantages.

#### SUMMARY OF THE INVENTION

Generally speaking, the present invention fulfills the foregoing needs by providing an assembly for attaching insulation material to a building frame member having a flange. The assembly includes a clip with a length dimension extending along a longitudinal axis and a width dimension substantially perpendicular to the longitudinal axis. The clip includes a pair of resilient grabbing members defining an aperture substantially parallel to the longitudinal axis for receiving the flange. One of the grabbing members has at least one opening, with a pin having a head and a sharp end extending through this opening. One self-locking washer is used to secure the pin to the clip or grabbing member of the assembly. An additional self-locking washer is used to retain the insulation after the insulation has been pierced by the pin.

In addition, a method for attaching insulation material in a building or similar structure is provided that includes the step of providing a frame member with a flange. A grabbing step allows the flange to be grabbed with a clip having a length dimension extending along a longitudinal axis and a width dimension substantially perpendicular to the longitudinal axis. The clip includes a pair of resilient grabbing members defining an aperture along the longitudinal axis for receiving the flange, and one of the grabbing members has at least one opening thereon. An inserting step allows a pin having a head and a sharp end to be inserted through the opening so that the sharp end faces away from the flange, and a piercing step allows the sharp end of the pin to pierce the insulation material. Respective retaining steps allow the pin to be retained in the opening and the insulation material to be retained in the pin using respective self-locking washers.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1A is a side view of a clip and pin assembly of the present invention in one exemplary combination with a frame member and insulation material.

5 FIG. 1B shows another exemplary combination of the clip and pin assembly of the present invention wherein the insulation is suspended so as to create a thermal barrier and thus lessening heat flow by conduction.

FIG. 1C shows yet another exemplary combination of the clip and pin assembly of the present invention using a mass insulation.

FIG. 2 is a side view of the clip of the present invention.

10 FIG. 3A is a bottom view of one embodiment of the clip and pin assembly of the present invention.

FIG. 3B is a top view of another embodiment of the clip and pin assembly of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

15 Referring to FIG. 1, the present invention is made up of a clip and pin assembly 10 that is attachable to a frame member 15 of a building. By way of example, frame member 15 may be configured in various forms, including a stud, joist, purlin, rib, trimmer, etc., and may be used to provide support to a roof or a wall of the building, and includes a flange 20 thereon. Clip 25  
20 has a length dimension 30 extending along a longitudinal axis 35, and a width dimension 40 that is substantially perpendicular to the longitudinal axis 35, which is illustrated more completely in FIGS. 3A and 3B.

Referring to FIG. 2, clip 25 has a pair of resilient grabbing members 45, 50 defining an aperture 55 substantially parallel to the longitudinal axis 35. Clip 25 may be formed from a single sheet of metallic material that is bent to form grabbing members 45, 50 and aperture 55. Aperture 55 is sized to receive the flange 20 therein. In one embodiment of the present invention, one of the grabbing members 45 is configured to have a rounded edge 60

proximate the aperture 55, and the other grabbing member 50 is configured to have a projection 65 extending at a predetermined angle 70 toward grabbing member 45. Predetermined angle 70 should be selected to facilitate entry of the flange 20 into the aperture 55 and to frictionally impede exit of 5 the flange 20 from the aperture 55 after the flange 20 has been inserted into the aperture 55.

Referring to FIGS. 1A-1C, 3A, and 3B, at least one opening 75 that is sized to receive and hold a pin 80 therein is included in one of the grabbing members 45, 50. Although FIGS. 1A-1C, 3A, and 3B illustrate that opening 10 75 is in grabbing member 50, it will be appreciated that opening 75 may just as easily be formed in the other grabbing member 45. Pin 80 includes a sharp end 85 and a head 90. Opening 75 should be sized so that the sharp end 85 may pass through opening 75 but head 90 may not.

In order to enable a user to insert a pin 80 into opening 75, for each 15 such opening 75 a corresponding opening 95 may be included in the opposing grabbing member. Although FIGS. 1A-1C, 3A, and 3B illustrate that corresponding opening 95 is in grabbing member 45, it will be appreciated that opening 95 may just as easily be formed in grabbing member 50 if opening 75 is formed in grabbing member 45. Opening 95 should be sized to 20 pass the entire pin 80 therethrough, and should be positioned so that pin 80 can be passed through opening 95 and into opening 75. Alternatively, it will be noted by those skilled in the art that pin 80 may be incorporated into opening 75 during the manufacture of clip 25.

Referring to FIG. 1, a set of washers 100, 105 is connected to the pin 25 80 as shown. Washer 105 is fixed on pin 80 proximate the sharp end 85, and applies an upward force on the insulation material 110 to retain the insulation material 110 in the pin 80. Washer 100 is fixed on pin 80 proximate the head 90 and applies a force on grabbing member 50 to retain the pin 80 in the opening 75. Pin 80 should be of sufficient size to receive the 30 washers 100, 105 and the insulation material 110 as shown. As shown in

FIG. 1B, it will be appreciated that, if desired, the length of pin 80 may be selected sufficiently long so as to allow for creating or interposing a thermal barrier, such as an air gap and the like, between insulation material 110 and frame member 15 so as to reduce conductive heat flow therebetween. In 5 addition, and as better seen in FIG. 1C, the length of pin 80 may be selected to accommodate the thickness of the specific insulation material, e.g., mass insulation, being supported by the clip assembly. Washers 100, 105 are preferably self-locking, with washer 105 being proximate to the sharp end 85 of the pin 80 and providing support against one side of the insulation 10 material 110, and the other washer 100 being opposite the sharp end 85 and providing support against the other side of the insulation material 110. In one embodiment of the present invention, washer 105 is capped to protect a user from sharp end 85.

Clip 25 may be sized to have a relatively small length dimension 30, 15 as illustrated in FIG. 3B, or may have a relatively large length dimension 30, as illustrated in FIG. 3A and in this case clip 25 may have a relatively low width to length ratio. Referring to FIG. 3A, for clips 25 with a relatively large length dimension 30, grabbing member 50 may include additional openings 75 positioned along the longitudinal axis 35 for receiving respective 20 additional pins 80. Each opening 75 should include additional washer sets 100, 105 to provide substantially aligned attachment between the insulation material 110 and the frame member 15 along the longitudinal axis 35. A clip 25 having a low width to length ratio may be conveniently selected if there 25 are no physical structures, such as walls, beams and the like, obstructing the placement of such clip on flange 20. If there are physical structures that prevent the use of a clip 25 with a larger length dimension 30, a clip with a smaller length dimension 30 may be selected so that the clip 25 will fit on the flange 20. A clip having a low width to length ratio allows for spanning a correspondingly long section of flange 20 with a single clip. This makes 30 installation of the insulation material less time-consuming and more

efficient. Further, the use of a single clip to span a longer section of flange 20 helps ensure that the insulation material will be positioned in a straight line along the length of the flange 20. This will reduce the risk that the insulation material will be misaligned relative to flange 20. It will be  
5 appreciated that the clip may be chosen to have any desired length so long as clip 25 maintains its structural integrity, or its handling does not become unwieldy to the user, or difficult to store and transport. The width dimension 40 may be relatively fixed, as the width of flange 20 may not vary much between frame members. However, the width dimension 40 may be sized to  
10 correspond to the width of flange 20 if necessary. By way of example of not of limitation, each of the respective embodiments shown in FIGS. 3A and 3B may have a width of about 1.5 inches while the embodiment of FIG. 3A may have a length of about 4 feet compared to a length of about 4 inches for the embodiment of FIG. 3A.

15 The method of the present invention will now be described in detail. Referring to FIG. 1, a frame member 15 with a flange 20 is provided. The flange 20 is grabbed with a clip 25 having a length dimension 30 and a width dimension 40 as described above. Flange 20 is grabbed by clip 25 by inserting the flange 20 into the aperture 55 defined by the pair of resilient  
20 grabbing members 45, 50.

In one embodiment of the present invention, one of the grabbing members 45 is provided with a rounded edge 60 proximate the aperture 55, and the other grabbing member 50 is provided with a projection 65 extending at a predetermined angle 70 toward grabbing member 45. Predetermined  
25 angle 70 should be selected to facilitate entry of the flange 20 into the aperture 55 and to frictionally impede exit of the flange 20 from the aperture 55 after the flange 20 has been inserted into the aperture 55. By way of example, such angle may be chosen to be 45 degrees relative to grabbing member 50.

Referring to FIGS. 1, 3A, and 3B, at least one opening 75 that is sized to receive and hold a pin 80 therein is provided in one of the grabbing members 45, 50. Although FIGS. 1, 3A, and 3B illustrate that opening 75 is in grabbing member 50, it will be appreciated that opening 75 may just as 5 easily be formed in the other grabbing member 45. Opening 75 should be sized to pass the sharp end 85 of the pin 80 therethrough, but should not allow the head 90 of the pin 80 to pass therethrough.

The pin 80 is then inserted through opening 75 so that the sharp end 85 faces away from the flange 20. In order to enable a user to insert pin 80 10 into opening 75, for each such opening 75 a corresponding opening 95 may be included in the opposing grabbing member. Although FIGS. 1, 3A, and 3B illustrate that corresponding opening 95 is in grabbing member 45, it will be appreciated that opening 95 may just as easily be formed in grabbing member 50 if opening 75 is formed in grabbing member 45. Opening 95 15 should be sized to pass the entire pin 80 therethrough, and should be positioned so that pin 80 can be passed through opening 95 and into opening 75. Alternatively, it will be noted by those skilled in the art that pin 80 may be incorporated into opening 75 during the manufacture of clip 25 and that the clip and pin may be optionally pre-assembled before being delivered to 20 the user.

Referring to FIG. 1, washer 100 is fixed on pin 80 proximate the head 90 and applies a force on grabbing member 50 to retain the pin in the opening 75. Sharp end 85 of pin 80 is then used to pierce the insulation material 110. Finally, washer 105 is fixed on pin 80 proximate the sharp end 25 85, and applies an upward force on the insulation material 110 to retain the insulation material 110 in the pin 80.

Clip 25 may be sized to have a relatively small length dimension 30, as illustrated in FIG. 3B, or may have a relatively large length dimension, as illustrated in FIG. 3A. Referring to FIG. 3A, for clips 25 with a relatively 30 large length dimension, grabbing member 50 may be provided to include

additional openings 75 positioned along the longitudinal axis 35 for receiving respective additional pins 80. By way of example, these additional openings 75 may be positioned substantially equidistant relative to one another along the longitudinal axis 35. The sharp ends 85 of these additional pins 80 are 5 used to pierce the insulation material 110 at multiple points along the length of the material 110. Additional washer sets 100, 105 are provided to retain the additional pins 80 in the additional openings 75 and to retain the pierced insulation material 110 in the additional pins 80.

It is believed that the clip assembly of the present invention provides 10 at least the following advantages:

- New and improved method of relatively quickly and inexpensively insulating new and existing buildings.
- Secure installation of insulating materials to horizontal and upright building frame members, such as purlins, joists, ribs, etc.
- Insulation to cover the bottom of the frame member to create a substantially continuous insulation system with a thermal break or barrier from the frame member based on the longitudinal dimension of the pin.
- Support of multiple types of insulation and facings, such as foam boards, also white poly/vinyl facings, and mass insulations including fibrous, cellulose, cotton and reflective insulation by the availability of different pin lengths.
- Installation of the insulation in any desired geometrical configuration (e.g., parallel or perpendicular) relative to the building frame member.
- A finished and aesthetically pleasing look to the ceiling or walls of the building by covering the beams behind the insulation.
- A clip-assembly than can be ruggedly constructed to be safely used to support heavy duty materials. Further, the clip-assembly may 25 be used to secure safety netting.

- A clip-assembly readily configured to provide easy sliding entry over a lip or flange of, for example the purlin, and upon entry providing sufficient gripping or frictional force to that lip so that the clip assembly does not become dislodged due to the weight of the insulation. The assembly may be readily removed to perform any necessary maintenance or repairs. The assembly may also be opened by hand or without special tools to be released from the purlin.
- A clip-assembly that can be readily installed without special machinery or substantial strength or dexterity.
- A clip assembly that will not interfere with the normal use of the building or the frame members therein to which the assemblies are attached.
- A clip assembly that can be re-used when the building life cycle is complete and therefore is a recyclable or environmentally-green building component.

It will be understood that the specific embodiment of the invention shown and described herein is exemplary only. Numerous variations, changes substitutions, and equivalents will now occur to those skilled in the art without departing from the spirit and scope of the present invention. Accordingly, it is intended that all subject matter described herein and shown in the accompanying drawings be regarded as illustrative only and not in a limiting sense and that the scope of the invention be solely determined by the appended claims.

CLAIMS:

I claim as my invention:

1. An assembly (10) for attaching insulation material (110) in a building or similar structures, the assembly comprising in combination:

a frame member (15) providing support to a roof or wall of the building, the frame member having a flange (20);

5 a clip (25) having a length dimension extending along a longitudinal axis (35) and a width dimension substantially perpendicular to the longitudinal axis, the clip having a pair of resilient grabbing members (45, 50) defining an aperture (55) substantially parallel to the longitudinal axis for receiving the flange, one of the grabbing members having at least one  
10 opening (75);

a respective pin (80) having a sharp end (85), the pin extending through the opening in the grabbing member;

at least one set of washers (100, 105) connected to the pin for retaining the insulation material inserted in the pin and for retaining the pin in the  
15 opening in the grabbing member.

2. The assembly of claim 1 wherein one of the grabbing members is configured to have a rounded edge (60) proximate the aperture through which the flange is received, the other grabbing member is configured to have  
20 a projection (65) extending at a predetermined angle toward the grabbing member with the rounded edge, the predetermined angle chosen to facilitate entry of the flange through the aperture, and to frictionally impede exit of the flange from the aperture after the flange has been inserted into the aperture.

3. The assembly of claim 2 wherein the set of washers comprises a pair of self-locking washers (e.g., 105), one of the self-locking washers being proximate to the sharp end of the pin and providing support against one side of the insulation material, the other of the self-locking washers (e.g., 100) 5 being opposite the sharp end and providing support against the other side of the insulation material.

4. The assembly of claim 3 wherein the self-locking washer (e.g., 105) proximate to the sharp end of the pin is capped to protect a user from 10 said sharp end.

5. The assembly of claim 2 wherein the clip has a low width to length ratio and the grabbing member with the opening includes additional openings (75) positioned along the longitudinal axis for receiving respective 15 additional pins, and further includes additional washer sets to provide substantially aligned attachment between the insulation material and the frame member along the longitudinal axis.

6. A clip (25) for attaching insulation material in a building, the 20 clip comprising a pair of resilient grabbing members (45, 50) with an aperture (55) therebetween, said aperture being substantially parallel to a longitudinal axis (35) and being sized to receive a flange (20) therein, one of the grabbing members including a rounded edge (60) proximate said aperture and the other grabbing member including a projection (65) extending at a 25 predetermined angle toward the grabbing member with the rounded edge, said predetermined angle being selected to facilitate entry of the flange into said aperture and to frictionally impede exit of the flange from the aperture.

7. The clip of claim 6 further comprising a pin (80) extending through an opening (75) in one of the grabbing members.

8. The clip of claim 7 further comprising a set of washers (100, 5 105) connected to said pin for retaining the insulation material in the pin and for retaining the pin in the opening.

9. A method for attaching insulation material (110) in a building or similar structures, the method comprising the steps of:

10 providing a frame member (15) with a flange (20);  
grabbing the flange with a clip (25) having a length dimension extending along a longitudinal axis (35) and a width dimension substantially perpendicular to the longitudinal axis, the clip having a pair of resilient grabbing members (45, 50) defining an aperture (55) along the longitudinal  
15 axis for receiving the flange, one of the grabbing members including at least one opening (75);

inserting a respective (80) pin through the opening, the pin having a substantially sharp end facing away from the flange;

20 piercing insulation material through the sharp end of the pin; and  
retaining the pin in the opening and further retaining the pierced insulation material in the pin with a set of washers (100, 105).

10. The method of claim 9 further comprising the steps of: providing in one of the grabbing members a rounded edge (60) proximate the aperture 25 through which the flange is received; and

providing a projection (65) in the other grabbing member, the projection extending at a predetermined angle toward the grabbing member with the rounded edge, the predetermined angle chosen to facilitate entry of the flange through the aperture, and to frictionally impede exit of the flange  
30 through the aperture upon the flange being admitted through the aperture.

11. The method of claim 10 wherein the clip has a low width to length ratio and the grabbing member with the opening includes additional openings positioned along the longitudinal axis.

5 12. The method of claim 11 further comprising the steps of providing respective additional pins into the additional openings, each pin having a respective sharp end;

piercing the insulation material at multiple points along the length of the material with each respective sharp end of the pins; and

10 retaining the respective additional pins in the additional openings and further retaining the pierced insulation material to the respective additional pins with additional sets of washers.

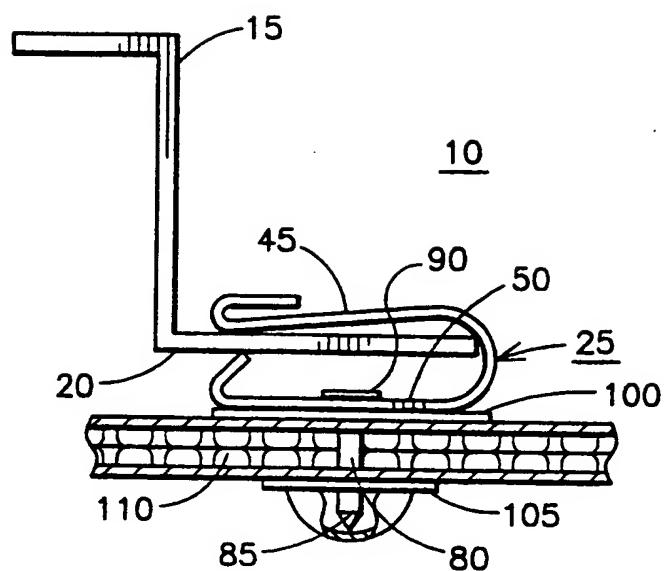


FIG. 1A

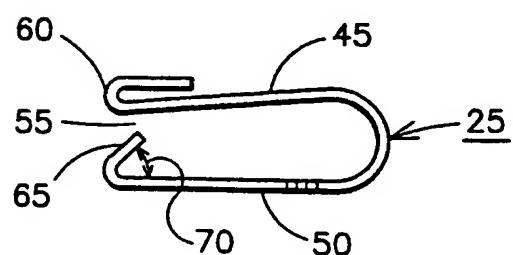
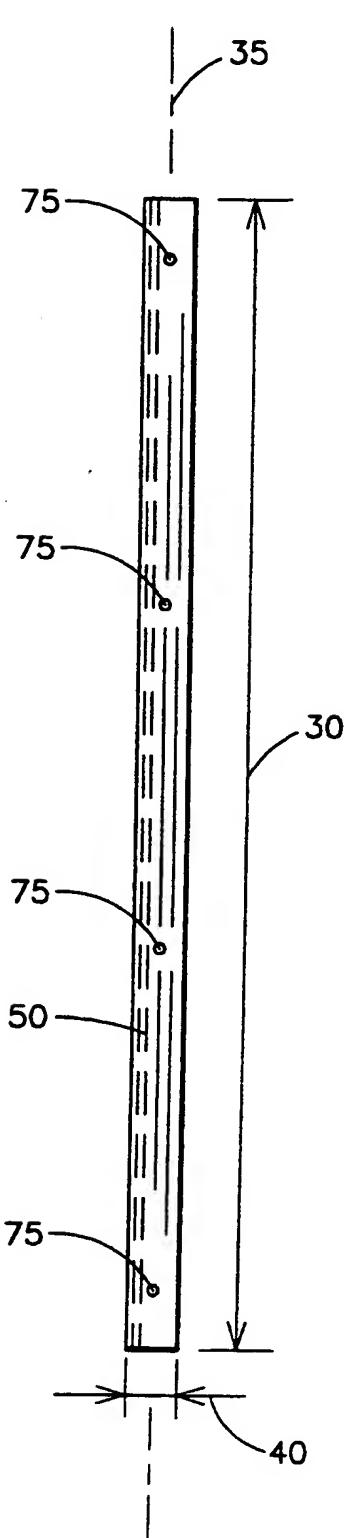


FIG. 2

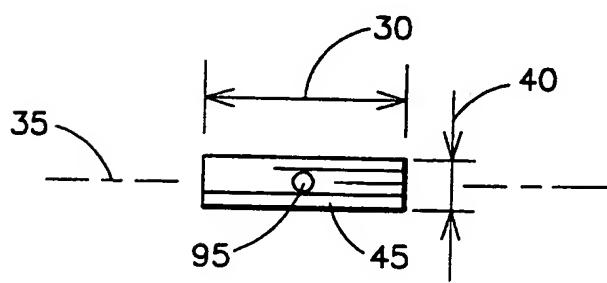


FIG. 3B

FIG. 3A

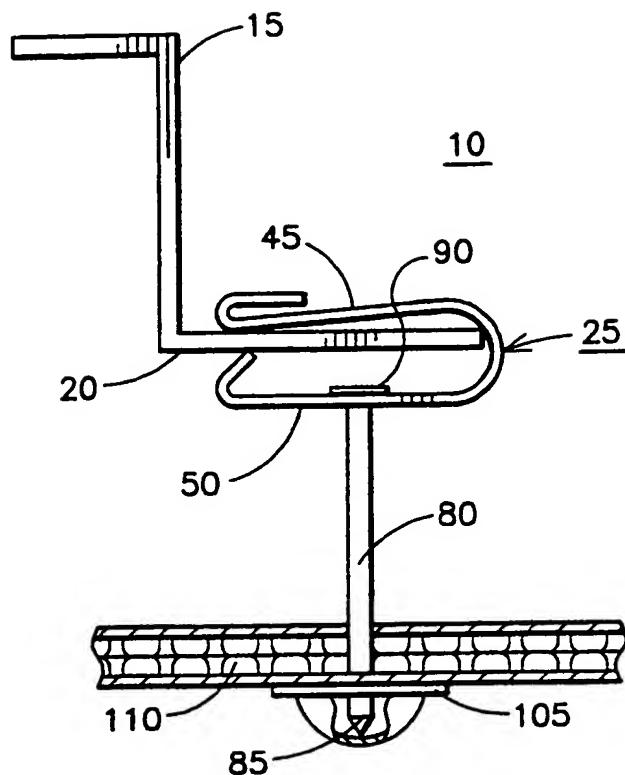


FIG. 1B

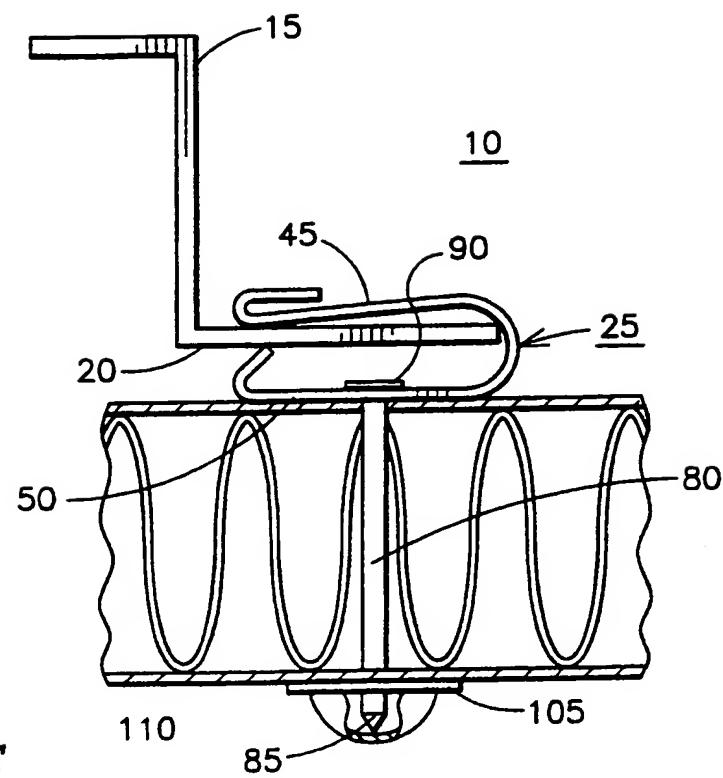


FIG. 1C

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